

# **Service-Learning to Promote Edible Insects**

*Effects of education and exposure on student  
perceptions of insects and entomophagy.*

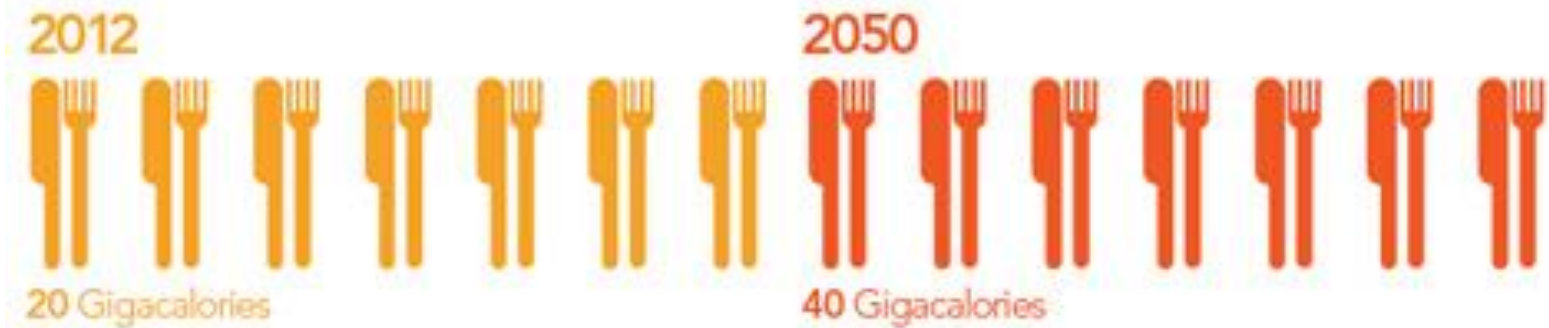
**Marianne Shockley and Audrey Wright**

**Dept. of Entomology**

**College of Agricultural & Environmental Sciences**

**University of Georgia**

# Introduction



# background:

## WHO'S EATING INSECTS?



**2 billion**

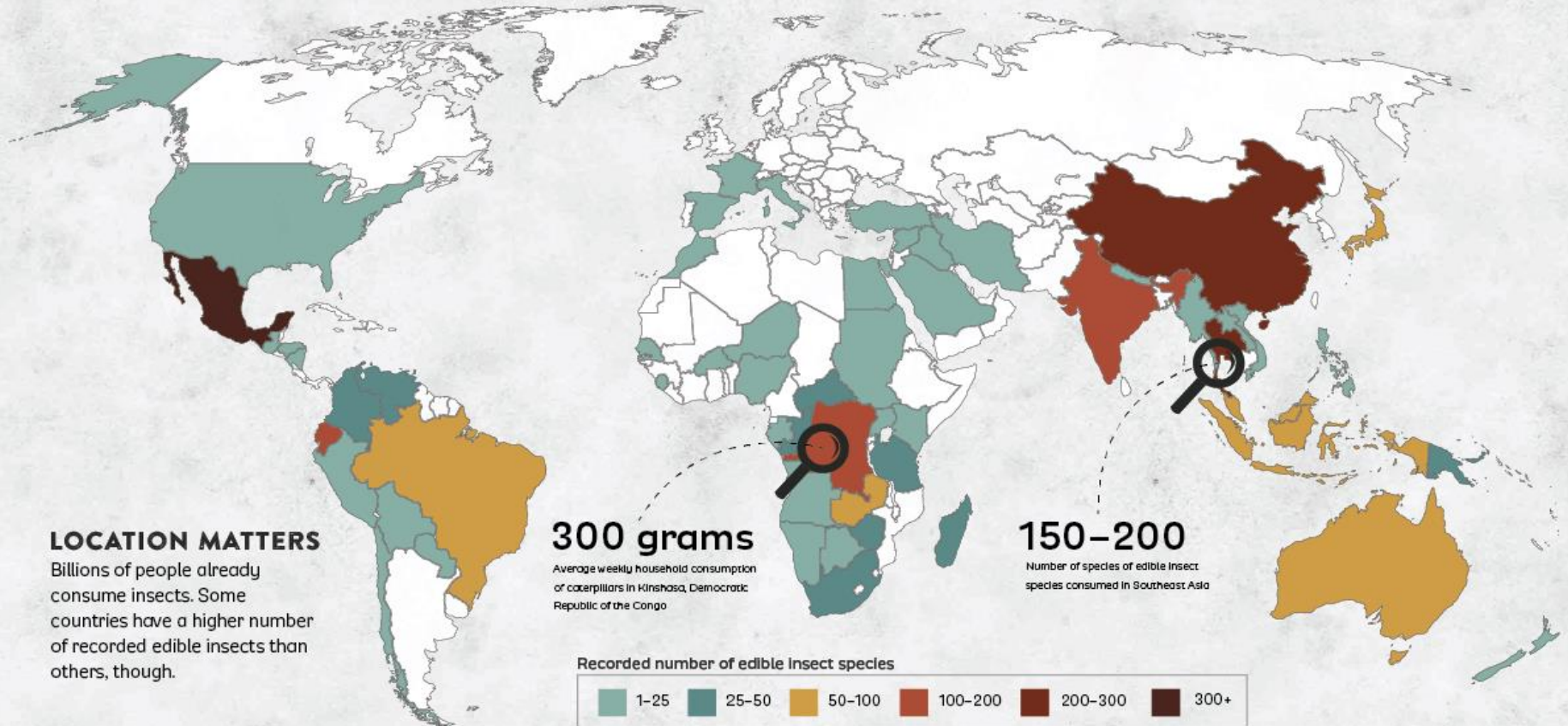
Number of people globally who regularly eat insects

[ entomophagy ]  
noun (entəˈmɒfəʒi) The consumption of insects as food, particularly by people.



**1,400,000,000 to 1**

There are an estimated 1.4 billion insects for every person on Earth



# EATING INSECTS

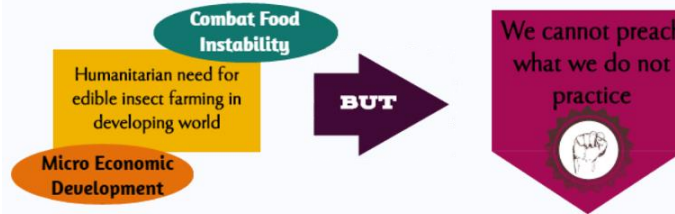
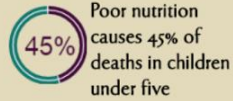
&

## Why it Matters in the West

**Problem:**  
Globalization = Western Opinion

Edible insects are wildly nutritious and sustainable.

So why is globalization KILLING traditional entomophagy and its humanitarian potential?



## Solution: Change Western Opinion!

Insects are a sustainable, nutritious AND gourmet FOOD.

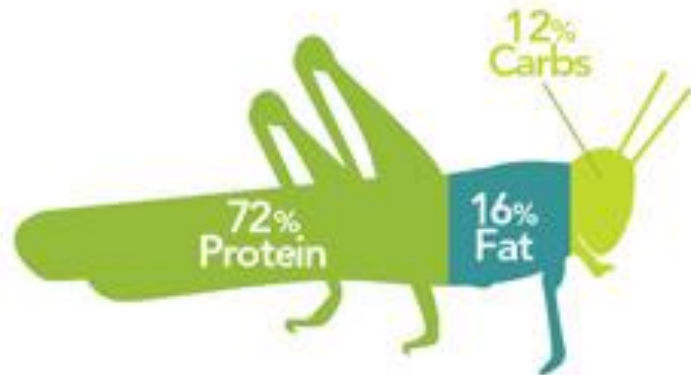
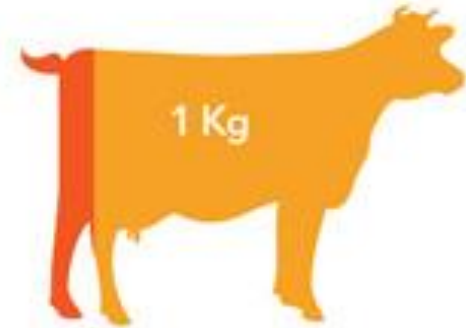


Get bugs on the menu

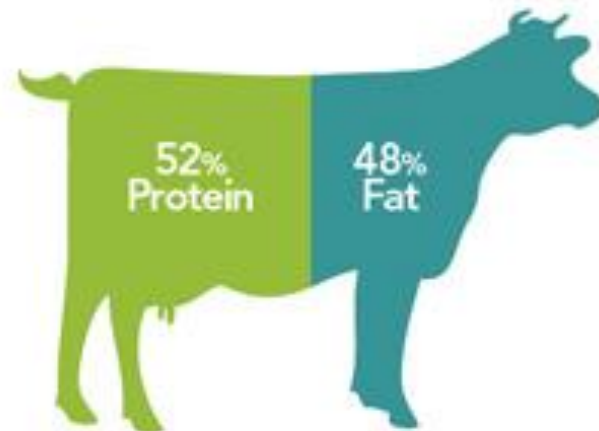
**bugivant.com**  
gastronomy on six legs  
\* edible insect recipes  
\* product reviews  
\* cooking tips



10 Kg Feed



grasshoppers  
96 kcal per portion



beef mince  
285 kcal per portion

# NUTRITION PROFILE COMPARING

## Cricket Flour vs Steak & Broccoli

Nutritional Component	Daily Requirement for 70kg adult	100g Cricket Flour	113g Steak (275 kcal)	9cups chopped, raw broccoli (277 kcal)
<b>ESSENTIAL AMINO ACIDS</b>				
histidine	0.70g	<b>1.44g</b>	0.975g	0.48g
isoleucine	1.400g	<b>2.59g</b>	1.391g	0.643g
leucine	2.730g	<b>4.61g</b>	2.431g	1.05g
lysine	2.100g	<b>3.61g</b>	2.583g	1.099g
methionine	0.70g	<b>1.09g</b>	0.796g	0.309g
cysteine	0.28g	<b>0.507g</b>	0.394g	0.228g
threonine	1.050g	<b>2.37g</b>	1.221g	0.716g
trptopan	0.280g	<b>0.560g</b>	0.201g	0.269g
valine	1.82g	<b>3.70g</b>	1.516g	1.018g
<b>OVERALL PROTEIN</b>	50g	<b>65g</b>	32g	2.8g
<b>B12</b>	2.4mcg	<b>30mcg</b>	6mcg	0mcg
<b>OMEGA 6:3 RATIO</b>	ideal ratio 3:1	<b>3:1</b>	18:1	1:2

Source: Nutrition profile provided by Maxxam Analytics

# *Human Grade Crickets and Cricket Powders/Flours*

## **BIG CRICKET FARMS**

AMERICA'S FIRST URBAN CRICKET FARM

[HOME](#)

[ABOUT US](#)

[PRODUCTS](#)

[FAQ](#)

[CONTACT US](#)

[BLOG](#)





**CHIRPS™**  
POWERED BY CRICKET FLOUR  
**CHEDDAR**  
3X MORE PROTEIN\*

**Nutrition Facts**  
Serving Size: 1/4 Cup (25g)  
Amount Per Serving: 100% Daily Value\*

Once upon a time, on the streets of Tanzania, a student ate an insect. And had a tasty idea. She learned that insects are powerful magnets, who better our health and reduce CO2 emissions. So with her two best friends, cricket chips they made for the bold and inspired who dare to dream unafraid. Our mission is to educate, to empower, to explore - to open up our minds to eating bugs and more. **Buy Appetit!**

**SIX** PLANTS

\*Non-GMO • Gluten-free • No artificial colors or flavors • 40% less fat • 6g of protein per serving  
\*\*3X MORE PROTEIN THAN REGULAR POTATO CHIPS  
†If you have an intolerance (allergies, diabetes, etc.) please check the ingredients list.

**CHIRPS™**  
POWERED BY CRICKET FLOUR  
**BARBECUE**  
3X MORE PROTEIN\*

**Nutrition Facts**  
Serving Size: 1/4 Cup (25g)  
Amount Per Serving: 100% Daily Value\*

Once upon a time, on the streets of Tanzania, a student ate an insect. And had a tasty idea. She learned that insects are powerful magnets, who better our health and reduce CO2 emissions. So with her two best friends, cricket chips they made for the bold and inspired who dare to dream unafraid. Our mission is to educate, to empower, to explore - to open up our minds to eating bugs and more. **Buy Appetit!**

**SIX** PLANTS

\*Non-GMO • Gluten-free • No artificial colors or flavors • 40% less fat • 6g of protein per serving  
\*\*3X MORE PROTEIN THAN REGULAR POTATO CHIPS  
†If you have an intolerance (allergies, diabetes, etc.) please check the ingredients list.

**CHIRPS™**  
POWERED BY CRICKET FLOUR  
**NATURAL**  
3X MORE PROTEIN\*

**Nutrition Facts**  
Serving Size: 1/4 Cup (25g)  
Amount Per Serving: 100% Daily Value\*

Once upon a time, on the streets of Tanzania, a student ate an insect. And had a tasty idea. She learned that insects are powerful magnets, who better our health and reduce CO2 emissions. So with her two best friends, cricket chips they made for the bold and inspired who dare to dream unafraid. Our mission is to educate, to empower, to explore - to open up our minds to eating bugs and more. **Buy Appetit!**

**SIX** PLANTS

\*Non-GMO • Gluten-free • No artificial colors or flavors • 40% less fat • 6g of protein per serving  
\*\*3X MORE PROTEIN THAN REGULAR POTATO CHIPS  
†If you have an intolerance (allergies, diabetes, etc.) please check the ingredients list.





# *Research Questions*

- Does entomological education and weekly exposure to live specimens change student perceptions of *insects*?
- Does entomophagical education and weekly exposure to live specimens change student perceptions of *entomophagy*?

# *Methods*

**5** weeks

**N= 50**  
students

ENTO  
**3300S**

**6** entomophagy  
modules

**14** survey  
statements

Survey & BEFORE  
AFTER

# *survey:*

1. Insects are ecologically important. \_\_\_\_\_

2. I like insects. \_\_\_\_\_

3. Insects are edible. \_\_\_\_\_

4. I would eat a whole, cooked insect. \_\_\_\_\_

5. I would eat an insect if I liked the food it was combined with.  
(Ex: chocolate-covered crickets) \_\_\_\_\_

6. I would eat an insect if it ~~was~~ not visible in the food sample.  
(Ex. insect protein powder as an ingredient in brownie mix) \_\_\_\_\_

7. I would buy insects to prepare at home if they were sold in the grocery store.  
(Ex. ground insect protein powder) \_\_\_\_\_

8. Excessive meat consumption can negatively affect human health. \_\_\_\_\_

9. I would eat insects as an alternative animal protein. \_\_\_\_\_

10. I value the environment. \_\_\_\_\_

11. Humans may be responsible for accelerated climate change. \_\_\_\_\_

12. Livestock production can negatively impact the environment. \_\_\_\_\_

13. Eating insects as an alternative protein could create a more sustainable food system. \_\_\_\_\_

14. Eating insects may be a solution to ending world malnutrition. \_\_\_\_\_

**Perception of  
Insects - yellow**

**Willingness to  
consume  
insects as food  
- green**

**Perception of  
Environmental  
Issues - blue**

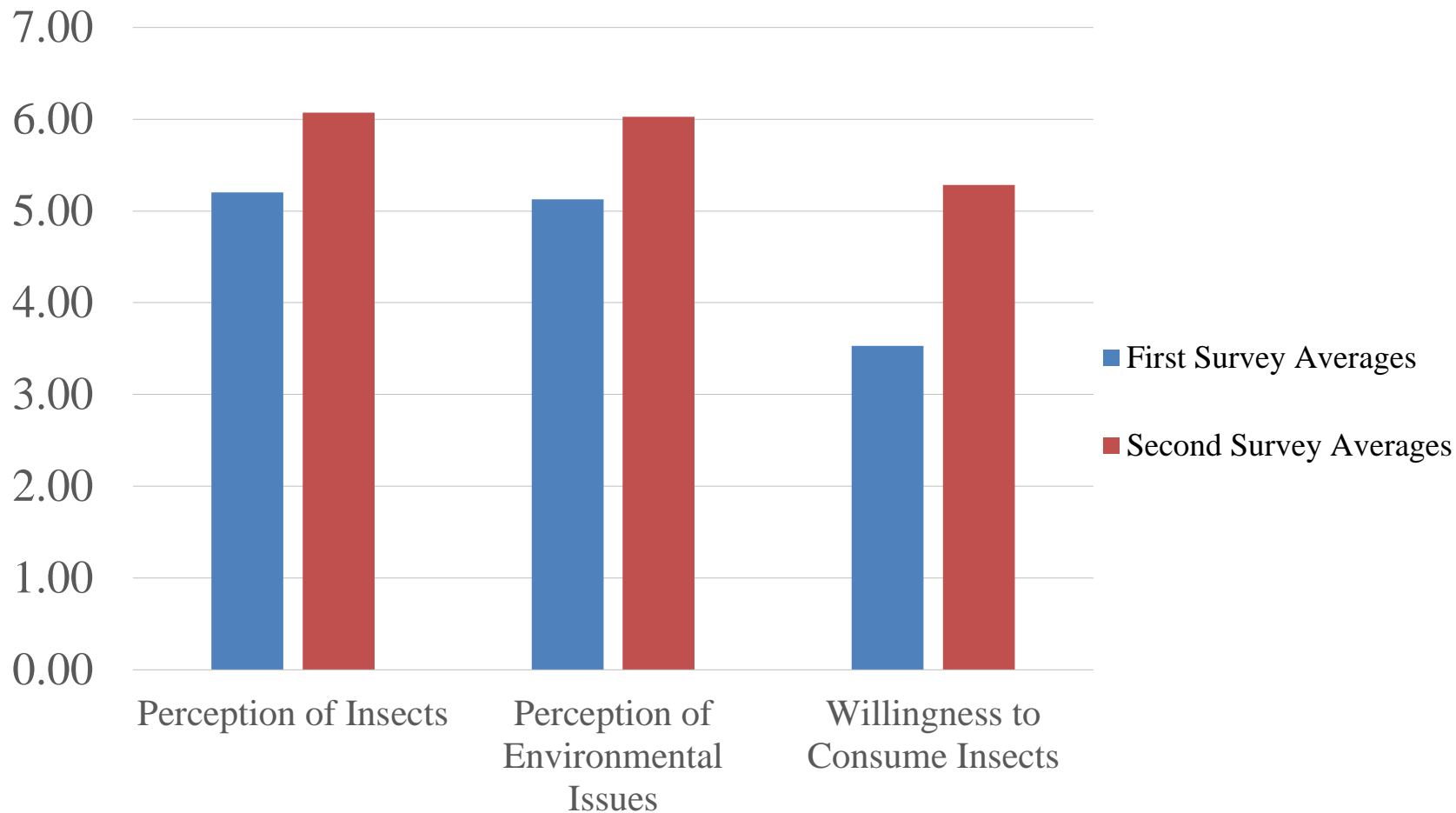
Question	First Survey Average	Second Survey Average	Increase in Average	Significant at 95% Confidence Interval?*
Insects are ecologically important.	6.61	6.71	0.11	No
I like insects.	4.46	5.18	0.71	Yes
Insects are edible.	4.54	6.32	1.79	Yes
I would eat a whole, cooked insect.	3.00	4.29	1.29	Yes
I would eat an insect if I liked the food it was combined with.	3.93	5.50	1.57	Yes
I would eat an insect if it was not visible in the food sample.	4.75	6.21	1.46	Yes
<b>I would buy insects to prepare at home if they were sold in the grocery store.</b>	<b>2.07</b>	<b>4.43</b>	<b>2.36</b>	<b>Yes</b>
Excessive meat consumption can negatively affect human health.	5.04	5.75	0.71	Yes
<b>I would eat insects as an alternative animal protein.</b>	<b>2.86</b>	<b>5.14</b>	<b>2.29</b>	<b>Yes</b>
I value the environment.	6.18	6.25	0.07	No
Humans may be responsible for accelerated climate change.	5.86	6.14	0.29	No
Livestock production can negatively impact the environment.	4.89	5.86	0.96	Yes
Eating insects as an alternative protein could create a more sustainable food system.	4.57	6.14	1.57	Yes
<b>Eating insects may be a solution to ending world malnutrition.</b>	<b>3.68</b>	<b>6.14</b>	<b>2.46</b>	<b>Yes</b>

\*calculated via one-tailed related mean t-test

# *data:*

	Percentage of students with a positive perception of insects	Percentage of students with a positive perception of entomophagy	Percentage of students aware of environmental issues
Before:	64%	14%	54%
After:	68%	75%	78%

# Changes in Perception



# *Discussion*

Does entomological education and weekly exposure to live specimens change student perceptions of *insects*? YES

Does entomophagical education and weekly exposure to live specimens change student perceptions of *entomophagy*? YES

# *Future Research*

- Student preparation of edible insect food items
- Compare students who have been exposed to the entomological education ONLY versus entomological education AND entomophagical education.
- Administer survey in subsequent semesters to various ENTO courses.



*Thank you for your  
time.*

*Questions?*